

EOS, Transactions, American Geophysical Union

Vol. 64, No. 50, Pages 977-984

December 13, 1983

Exploration Geophysics

0520 Magnetic and electrical methods RIFCTEOMARKETIC MORLING OF TREAS-OTHERSIONAL DOGIES IS LATERSO KASTHE USING INTROPAL EQUATIONS Philip 3. Vennesher iSarth Science Laboratory. University of Utah Reseatch Institute, A20 Chipete Way. 4ce. 120, Oalt Labs City, UT 841081 Garald W. Uchmann, and William 4. Gastlipe

see. 120. Oalt Lake City. Or Sales! Garaid W. Hohmann, and Williams a. Genfilipo. We have devaloped an nigorithm based on the method of integral equations to simulate the electromagnetic responses of threa-dissensional bedies in layered certhe. Yes inhomogeneities are replaced by an equivalent current distribution which is appronimated by pulse hasfs functions. A matrix equation is domatructed uning the electric tensor Orean's function appropriate to a layered earth, and it is noived for the vector current in coach soil. Subsequently, scattered fields are lound by integrating electric and magnatic tensor Orean's functions over the scattering currents.

Efficient switching of the tensor Grane's functions is a major consideration in reducing computation of the six allectric and live suggestic Haskel transforms defining the secondary Orean's functions is praferable to any direct Hankel transforms defining the secondary Orean's functions is praferable to any direct Hankel transforms defining the secondary Orean's functions is praferable to any direct Hankel transforms defining the secondary Orean's functions is praferable to any direct Hankel transforms defining the secondary Orean's functions is praferable to any direct Hankel transforms defining the secondary Orean's functions is praferable to any direct Hankel transforms defining the secondary Orean's functions is praferable to any direct Hankel transforms defining the secondary Orean's functions is praferable to any direct descriptions.

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GEOFPASSICS, Vol. 49., NO. |

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O. Brower 2015, Pitzborgh, PA 15330) O. H. F. Gardnar,
and John A. Habpanld
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toptaining numerous small pinnacle reals. The surface topography is flat, but it contains doup crosional valleys filled with glatial drill which produce them shitts in the data. The data were processed without static corrections. To produce the eliert of small exercing a model was designed to produce data recombing those taken over a pinnacle reaf. Belsele data were collected over this model by a method simulating the power envelops and the instantaneous pinna of the power envelops and the instantaneous pinna of the signated data were goversted at a specified one-way tinn, when vertous source and receiver dependent atmics had been introduced into the raw data. The statics were designed to simulate the effect of glacial drift. If the dismator of the migration specture is nignificantly inger then the diatance mione the course and coccleve interest the the distance affected by statics, the offect on the signated output is minnal, However, it the distance affected by statics, the offect on the signate output is minnal, However, it the distance affected by attaics, the offect on the signate output is minnal. However, it the distance affected by attaics, the offect on the signate output is minnal.

0930 Enisale wathods CHOSE-HOLE SEISHIC SUSYEYE: APPLICATIOES FOR CITOTING COMBURFACE PRACTURE SYSTEMS AT A HOT BOY ROCK CHOTHERNAL

Rich nel Pabler (Osophysics Otoup, Oragon Stata Vulvarnity, Corvollia, OR 7731) Ordis Pastnon The use of troes boin selasic surveys for delinating the losation sod sine of submurface iracture systams is investigated. The tadistion pattnra for fand S vaves meltend by a snismic source la aborchole is derived, Experimental work in relatively homognamous granith suggnate that the derived reinticanhip and question and acountit transductry fine the derived in the court of th

the new and tempose the Hot Gry Roch Onetheral Santvoir the P- and G-wave amplicades as a function of distance the P- and G-wave amplicades as a function of distance from the socret, composets for the redistion pettarn and gaometrical presents agreed the relative attenuation to a functive of the form aspiral applicades and standard the relative attenuation to a functive of the form aspiral application of the reservoir, we attend when of the reservoir, we attend whiles of or S wave. Using ber mathod we are oble to detect a desrease is the average Q due to extensive fracturing following hent extraction from the Youton Bill reservoir.

We have also been able to locate discrete large-meals fractures in the reservoir by notice resions therefore or frequency content that cannot be explained by tadfation pattern offered or indrassed the sourch-reservoir appearance or indrasses the regions in the Penton Bill 200 Ory Spek tesservoir are probably peps Ireaumns.

PEOPHYRICE, VOL. 45., NO. 1

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Onephynics, Honelule; Presently Manney
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GROPHYSICS, VOL. 49, NO. 1

0930 Seiseld mothods
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Myung W. Los [U.O. Osofogical Survey, Sox 25046, M W.
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News

Earth Sciences Priorities

Priority research areas for the solid carth sciences were recently identified by two blue-ribbon panels. Each suggested specific areas where funds should be targeted for rapid advances in expanding our knowledge of the earth and for long-term payoffs both in basic research and in training the next generation of earth scientists. of earth scientisto.

In its report released last week, the Research Briefing Panel on the Solid Earth Science identified five priority research topics. In a report issued earlier this year, the Committee on Opportunities for Research in the Geological Sciences selected for top billing eight such research areas. The common scientific thread running through both reports: More research is needed on the structure, composition, and evolution of the continental lithosphere and on the dynamics of tectonic

The Research Bricking Pauel on the Solid Earth Sciences (see box), was formed by the Committee on Science, Engineering, and Public Policy (COSEPUP) of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Meili-cine. The panel prepared ito report for the Office of Science and Technology Policy (OSTP), NSF, and selected federal departments and agencies. OSTP Director George A. Keyworth, II, who also is President Ronald Reagan's science arlvisor, is a long-time arlvotate of setting priorities for research support (Eas, May 10, 1983, p. 371) and has repeatedly praised the National Research Countil's (NRC) Astronomy Survey Committee for oetung out its priorities last year in what is tour-monly called the "Field Report," after comnittee chairman George B. Field (Ess. May

18, 1982, p. 506).

The Committee on Opportunities for Research in the Geological Sciences (see box)
was formed by the NRC Board on Earth Sciences (BES) at the request of James F. Hayo, director of the division of earth sciences of the National Science Foundation (NSF). Havs requested the BES, formerly the Geological Sciences Board, to report on "the state of science and to recommend policy for the decade of the voor relevant to the atademic commu-nity and the resulting report, Oppor-tuatites for Research in the Geological Sciences, emphasizes carth science research that has "typically been supported" by NSF. NSF pro-vides 90% of all federal funds going to colleges and universities for basic geological ociences research. Among the relevant reports on which the COSEPUP briefing panel based its recommendations was the BES committee

The COSEPUP briefing panel identified five topics that would he likely to yield signifi-

Solid Earth Sciences Panel

Charles R. Drake of Dartmouth College (and AGU President-Elect) and Don L. Anderson of the California Institute of Technology cochaired the COSE PUP Re-search Briefing Panel on the Solid Earth

Members of the panel were William R. Dickinson, Univ. of Arizona; Carl Kleslinger, CIRES, Dolv. of Colorado; John G. Maxwell, Univ. of Texas at Austin; V. Rama Murthy (Iniv. of Minnesota; Jack F. Oliver, Cornell Univ., C. Barry, Raleigh, Lamont Dollerty Geological Observatory; Frank M. Richter; Univ. of Chicago; Eugene M. Shoëmaker; U.S. Geological Survey; Edward Stohen; Gal Tech; and Peter J. Wyllie, Cal Tech.

Committee on Opportunities for Geological Research. Members of the panel were William R.

Physical Company

cant scientific payoffs with increased funding in fiscal year (FY) 1985; the 8ES committee looked at FY 1985 and ahead to FY 1990. President Reagan will send his proposed budget for FY 1985 to Congress by mid February. The briefing panel's report "emphasizes areas that lie on the frontiers of earth sciences . . . and describes some of the conceptual and technical advances that make it posoible to explore more fully the third and fourth dimensions, slepth and time." The five areas are

- seismir investigations of the continental
- continental scientific drilling physics and chemistry of geological ma-
- global digital seismic array
 oatellite geodesy.

Of the opecific projects recommended. some "such as deep continental drilling, de-

termination of the continental geoid, and crustal seismic rellection, can proceed imme-diately if resources are made available," the panel says. "Others, outly as large seismic arrays, expanded isotopic exploration of the criot and mantle, monitoring of crustal mo-tions, and the outly of chemistry and physics of geological materials, require major investments in modern facilities."

The BES committee, on the other hand, identified eight areas "having the must promise for advancing geology in the next decade." With the exception of the lirst topic listed, no significance is intended by the order. The eight areas arc

- more detailed and accurate definitions of the structure and composition of the conti-neural lithosphere, including the continental margino · quantitative models for sedimentary ba-
- sin evolution · improved understanding of magnia gen-
- eration and emplacement • knowledge of the physical and chemical
- · a better mulerstanding of tectonic processes, the physical and chemical states that produce them, and the structures that result a model of convection in the earth's inte-
- evolution of life

properties of rocks

• surficial processes. While the COSEPUP briefing panel did not make specific funding recommendations, the BES committee did. "In our view," the committee report states, "an appropriate response to the needs of the field would require an anmual increment of \$21 million to the Presidem's 1984 budget." President Reagan's hscal 1984 budget proposal for the earth sciences division was \$42 million (Eos, February 15, 1983, p. 65). 8y fiscal 1990, the 8ES committee report cominues, "a goal of an additional \$53 million over the 1984 budget for NSF's Division of Earth Sciences is a justifiable and realizable goal." The committee recognized, however, that "funding recommendations for FY 1990 are naturally more speculative." Among the initiatives ouggested by the BES

committee are a program of continental drill-ing (with a suggested funding level of \$4 mil-lion in FY 1985 and \$20 million in FY 1990).

Funding for seignic reflection studies should be be doubled, in the committee's view.—BTR

Winter Weather **Forecast**

A milder-than-normal winter is predicted for the eastern and western extremes of the United States, while the country's midsection can expect colder than normal temperatures, according to the winter weather oudook issued November 28 by the National Oceanic and Atmospheric Administration's National Weather Service (NWS). The oudook (Figure ton), which covers December, lanuar February, also predicts that the Northwest, Midwest, and the lower Mississippi valley can expect greater than normal precipitation

Independently, researchers with the Climate Research Group at the Scripps Institu-tion of Oceanography (SIO) issued their winter weather forecast on November 29. While the temperature outlook by Jerome Namias and Daniel Cayan (Figure 1, bottom) shows a similar—though not identical—pattern to the NWS prediction, the SIO researchers' precipitation prediction (Figure 2, boltom) is very different from the NWS one.

Donald L. Cilman, chief of the NWS predictions branch, said that the probabilities of a warmer than normal winter exceed 55% in the East and South, rising through 60% along the Appalachian Mountains to at least 65%. on the east coast from Florida to Massachusetts. The probabilities of warmer than normal temperatures reach a maximum of 70% from South Carolina to Long Island. Except for the extreme Northwest and interior California, the probability of a reladvely warm winter exceeds 55% everywhere west of the Continental Divide. The probabilities of nor-

News (cont. on p. 986)

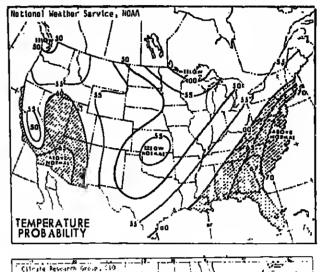
Lithospheric Seismology

hara Convention Center in Madison, Wis., January 13-14, 1984, to formulate the organizational plan for an institutionally based consortium for lithuspheric and other portable array ecismology. It is hoped that participants will represent a wide opectrum of geophysics and geology to assure that the plan which energeo from the meeting reflects a broadly based consensus of the earth science community.

A new national program is being initiated whose goal is to acquire a minimum of 1000 matched, portable digital ocismo-graphs for carrying out high resolution, 3dimensional scionic imaging of the conti-nental lithosphere to depths well into the upper mantle. Present design plans call for inicroprocessor-based, multi-compo-

An open meeting will be held at the Lanara Convention Center in Madison, Wis., annary 13-14, 1984, to formulate the orsources over user-selected bandwidth(s) within the range 0.01 to 200 Hz. The instruments are expected to be modular and of oufficient versatility that they can be used to address a diverse range of scientific problems (from miccoseismicity to surface wave tomography in deep earth structure) in addition to continental lithospheric imaging.

Those interested in attending the Mailison meeting may obtain further information by writing to Organizing Committee, CIW/DTM, 52-11 Broad Branch Rd., N.W., Washington, DC 20015, or by calling David James (202-966-0863) nr Bob Meyer (608-262-1698).



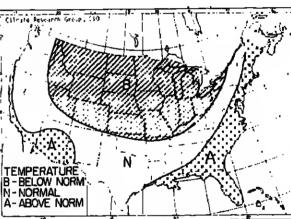


Fig. 1. Temperature predictions for the 1983-1984 winter, defined as December through, and including, February. (top) The National Weather Service winter outlook uses probability contours. (bottom) Prediction made by Jerome Namias and Daniel Cayan of the Scripps Institution of Oceanography (SIO) uses the above-normal, below-normal, and nor-

Hove PRECIPITATION PROBABILITY

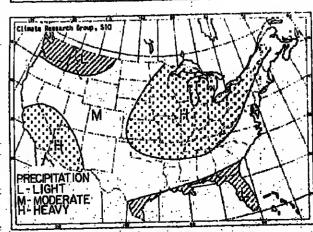


Fig. 2. Precipitation predictions for the 1983-1984 winter. The National Weather Service outlook (top) and the SIO researchers' outlook (bottom) differ markedly.

News (cont. from p. 985)

mal temperatures exceed 60% in Nevada, the far Southwest, and on the California coast. They peak at 65% in the Arizona-Southern California sunbelt. NWS has been using probabilities in their long-range forecasts since fulv 1982.

Little evidence supports any clear tempereture patterns for the remainder of the midwest and Great Plains and for the Pacific Northweat, Gilman said.

Similarly, Namias and Cayan say that tem-

peratures are expected to appruach normal in the far West, with slightly warmer-thannormal temperatures in areas along coastal California, southern California, and southern Arizona. Normal winter temperatures are expected for the far Nnrthwest, much of Cali-fornia, Nevada, Utali, northern Arizona, New Mexico, Texas, Oklahoma, Arkansas, and e narrow band of states extending through the region west of die Appalachians. The SIO researchers say that above-normal temperatures are expected along the southern Culf Coast states and the eastern seaboard.

normal precipitation in the Northwest, Mirlwest, and lower Mississippi valley, except for a 60% chance near die lower Mississippi Riv-er. Chances of below-normal precipitation are 60% from the Big Bend to southern Arizona, Cilman said. In the southest from the Rio Crande Valley through New Mexico and Anzona to the central and southern ranges of the Sierra Nevada, there is a 55% chance of below-nurmal precipitation.

NWS predicts a 55% probability uf above-

Namias and Cayan, on the uther hand, pre-

tinn to fall in the Northwest, along the Gulf Chast, and in Florida. Heavy precipitation is anticipated for the sunthern half of Califor. uia, Nevada, and southern Arizona. The rescarchers do not expect the Pacific storage that penetrate the west coast to match the frequency or intensity of last winter's batter ing storms. Heavier than normal precipiation also is predicted from the midwest to be Appalachian Mountains.

Books

Oceanography: The Past

M. Sears and D. Merriman (Eds.), Springer-Verlag, New York, xx + 812 pp., 1980, \$39.80.

Oceanography: The Present and Future

P. G. Brewer (Ed.), Springer-Verlag, New York, xii + 392 pp., 1983.

Reviewed by Arnold L. Gordon

Oceanography is a young science, close to its historical ruots, but it's maturing fast as "state-of-the-ari" technology and computeraided numerical morteling play in increasing cole. Our ability to obtain, process, and sur-lyze enormous volumes of data would stun an oceanographer of the 1980's. (I hope he would be equally impressed by the quality of modern data.) The Third International Congress nn the History of Oceanography and the celebration of die 50th anniversary of the Woods Hole Oceanographic Institution (WHOI) were both held in September 1980 at WHOI; and both events were taken as an opportunity to improve our understanding of the past and present of oceanography, and future of the ocean sciences with the thought that we could thereby better influence future

Two bnoks resulted from the presentations at the Septembee 1980 incelings at WHOI: Oceanography: The Past, edited by M. Seacs and D. Mern man, is the proceedings of the Third International Congeess, held September 22-26 (the first congress was held in 1966; the second in 1972); and Oceanography: The Present and Future, edited by P. Brewer, is the proceedings of the symposium, held September 29 to October 2, celebrating the founding of WHOI.

I am particularly impressed by Oceanogra-phy: The Past, which brings to the reader a whole array of little known facts, impressions, and glimpses of the past. The attempts of oceanographers to keep up with the new scientific literature and the science classics limits their reading of oceanography history. This book effectively introduces oceanographers to history and. I hope, whets appetites for further reading of more in-depth accounts, which are included in the various reference

lists for each article. There are 69 articles in Oceanography: The Past, most of which are quite short (10 or fewer pages), grouped in no particular order. They deal with a very broad array of topics.

Some trace the founding of oceanographic laboratories. WHOI is discussed within many

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by R. H. Eather

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articles; those by Fye; Revelle; Schlec; and Haedrich and Emery were particularly enlightening. Some labs, such as Tortugas Marine Laboratory (Colin's article), have not survived to the present. Some articles deal with instrument development; Hendershott's The Role of Instruments in the Development of Physical Oceanography and Spiess's Some Origins and Perspectives in Deep-Ocean Instrumentation Development are quite good. Others deal with conceptual develope (Konvitz's Changing Concepts of the Sea, 1550-1950: An Urban Perspective). The articles by Herman and Platt on the co-evolution of concepts and instrumentation in plankton sampling are particularly effective. Others deal with more ubscure topics, such as The Victorian Aquarium in Ecological and Social Perspective by Rchbock and Traditional Chinese Ichthyology and Its Encounter With Jesuit Science: An Historical Survey by Crown. Many present the development of ocean science within various countries (Peru. India.

contribution of individuals (such as Agassiz, Vauglian, and Smith). The style of the articles is nneven, varying from clenrly historical topics to attempts at reviewing a discipline. A rhapter is devoted to the Six Thermometer, rendered obsolete by the deep-sea reversing thermometer, now also an endangered species. A chapter about salinity might have been interesting.

Switzerland, Poland, among others) or the

Oceanography: The Present and Future includes 22 articles grouped in fuur sections: Small and Local Scale Oceanography; Regional Scale Oceanography: Clobal Scalc Oceanography: and The Human Scale. The scone of each of the first three sections is obvious. The fourth section covers topics uf direct concern to society: fate of Yossil-fuel CO₂ (Bolin, Changing Clobal Biogeochemistry); generation of energy from the ucean (Lavi, Innovative Ocean Energy Systems: Prospects and Problems); the possibilities of ocean farming (Gordin, Aquaculture); the importance of good linkage between science development and development of technology Baker, Technology and Communications: New Devices and Concepts for Ocean Mea-surement); and a brief discussion of Institu-

tional and Educational Challenges by Steele. However, other human-scale issues are included in the other sections, e.g., Murphy's The Ocean Nearly: Enviconmental Problems and Public Policy in the Next Fifty Years and Berman's The Impact of Oceanography on the Military and Security Uses of the Ocean. Pilkey's Shoreline Research might also qualify for the human scale.

The articles are not exhaustive reviews but personal reflections of where we stand and where we're going, by people actively en-gaged in research. Their views are valuable,

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and the book makes for interesting reading. find Harbison's The Structure of Planktonic Communities most interesting: He ilues a nice job of presenting the difficulties in obraining unambiguous planktorr community data. He says, "The time has come in try tu live and work in the open ocean" so that "Those of us interested in plankton ecology" can more closely "become like these 19th cen-

tury naturelists. Turner and Carrett do admirable inbs in their articles on Fine and Microscule Ocean Siructures and nn Coastal Dynamics, respectively. Turner points out how the measurement of temperature and salinity continuously with depth altered our views of the vertical profile; one wonders if similar horizontal resplutions across fronts might have a similar impact. In Carrett's article, I particularly like his five levels of answers to questions pertaining to physical oceanographic processes; we generally are not yet at the highest conclusive

theoretical level. Walter Munk's treatment of Acoustics and Ocean Dynamics gives a good historical ac-

count that leads to the potential of ocean acoustic tumography. He ends with two proposals: lirst, that someone who paricipated in the development it underwater sound technology should give a firsdiand account of this era before it is tou late; second, that we neerl a civilian acoustic array to serve as an observatory for ocean studies.

Childress' Oceanic Biology: Lost in Space? tells of the loneliness of the abyssal creature; lic even ends with a poem, a rare event in uceanngraphic literature.

I lind Rossby's article on Eddies and the Lieneral Circulation and Niller's General Circulation of the Ocean most in line with traditional cumprehensive review articles.

Oceanography: The Present and Future makes a nice companion to Oceanography: The Past.
We all lnok forward to the WHOI centennial

Arnold L. Gordon is with Columbia University's Lamont-Duherty Geological Observators, Palisades,

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Research Associate (postdoctoral) with background in physical oceanography and atmospheric
sciences and interests in dynamical aspects of cli-

sciences and interests in dynamical aspects of cli-mate variability. Term of appointment: one (1) year, renewable for a second year subject to the approval of the Gouncil. Closing date: February 1, 1984. Send curriculum vitae and a list of four 14) refer-ences to Director, 115AO, c/o Department of Atmo-sphenc Sciences, AK-40, University of Washington, Seattle, WA 98196. An Equal Opportunity/Affirmative Action Em-ployer.

Texas A&M University/Geological Oceanography Positions. The Ocean Drilling Project (ODP) invites application for the following anticipated positions: Several full-lime staff sciendsta (Ph.O. required). These openings, in various fields of marine geoscience, are anticipated to be filled over a one year period commencing t October 1985. The successful candidates will be expected to participate experiod commencing to Cooper 1985. The successful candidates will be expected to participate experioding the publication of results. The successful candidates will be expected to attend the Joides panel meetings relating to their scientific expertise. Several full-lime marine technicians. Previous shipboard experience and undergraduate degree in geology or related science highly desirable. These positions require participation of about 6 mouths, per year (alternating two months on and two months off) aboard a scientific drillship charter. Applicants should submit a letter of application, curriculum vitae and names of 3 references to: Dr. Philip D. Rabinowitz, Project Director, ODF, Depty of Oceanography, Texas A&M University, College.

Mineratogiat/Petrologist/Geochemist—South Dakota School of Minea. A position as Research Scientist I (teseate it equivalent of assistant professor) is currently available in the Institute for the Study of Mineral Deposits (ISMI)) at the South Dakota School of Minera and Technology, Rapid Chy, South Dakota. A Ph. Li. degree in the general areas of minerating specialogy-gens hemistry is required and the Ph.D. degree must be in hand before assuming the Institute with ISMID. The successful appears with ISMID and the research trouglants conducted for I. MIT and the fact emphasis on the mineral degrees as the responsibility will concern a long-term, indepth study of strataform gold rieposits in the Black Hills. ISMID has a fully automated (WDS + EDS) min open other and a new state of the art automated ununce absorption apectrometer with inductively mining absorption apectrometer with inductively mining absorption apectrometer with inductively mining absorption spectrometer with inductively complete plasma touch (AA/ILP) for major, min and trace element analysis. Arrangement are in place for neutron activation analysis (Battelle, Rich land, Washington) and light stable isotope analysis

(U.S.C.S.).
Cantildates for the position should send resumer and three teners of recommendation to:

J. J. Papike, Director, ISMO
South Daknia School of Alnes and Technology
500 Fast St. Joseph Street.
Raplif City, South Dakota 57701–5995
For additional information, call (605) 394-6152.
SOSM&T Is an ultimentive-action/equal opportunity

University of South Carolina/Tonure-Track Positions to Genlogy. The Department of Geology inviers apply ations for two anticipated tenure-frack positions to two of the following areas: 1)Geophysics.
2) Igneous Pen obsyy/Structure; 3) Geosal Processes; or 4) Organic Sediments. It is anticipated that
the appointments will be of the assistant professor
level, but applications from more senior persons all
also be given strung consideration. A Ph.D. degree
is required. Starting date will be August, 1984, with
an application deadline of I March 1984. Applicano
should send curriculum vitae, statement of research
interests, perlinent reportus, and the names of thee
references to: Dr. Bjorn Kjerfve, Oepartment of Geulugy. University of South Carolina, Columbia, S.C.
20208 (Phone 803-777-1520).

The University of South Carolina is an Equal Opportunity Employer which encourages applicant
from qualilited minority groups and women.

From qualified minority groups and women.

SUNY-Atbany/Tenure-Track Position in Tectodes or Structural Geology. The Department of Geological Sciences at the State University of New York at Albany invites applications for a tenure track position in TECTONICS or STRUCTURAL GEOLOGY starting Fall, 1984. We welcome application with interests and experience in tectonic processes, including geophysical and sinutural approaches; structural geology, Including physical properties of earth materials or structural aspects of melamorphic processes; or similar fields which complement out existing strengths. Preference will be given to indicate the studies. The position will be filled at the Audicate or Assistant Professor level, Inquiries or applications should be addressed to Dr. W.D. Mean, Department of Geological Sciences, State University of New York at Albany, 1400 Washington Avenue, M. New York 12222. Application deadline is believed in the properties of the professor level. Inquiries of Sciences, Sunta University of the State University of the Uni

Post-Doctoral Postition/Naval Postgraduate School.

The Ocean Turbulence Laboratory has available a post-doctoral postdon for a person interested by the post-doctoral postdon for a person interested by the post-doctoral postdon for a person interested data. The lenure is for 1 or 2 years. The accessful data. The lenure is for 1 or 2 years. The accessful data should have a Ph.D. In physical of canodicate should have a Ph.D. In physical of canodicate should have a Ph.D. In physical of canodicate in the preferrable it is not essential. The opportunity data is preferrable it is not essential. The opportunity of the physical of the preferrable it is not essential. The opportunity of the preferrable is not essential. The opportunity of the preferrable is not essential. The opportunity of the preferrable is not essential.

Resumer can be sent to Ur. R. G. Lucck Code (6817, Naval Postgraduate School, Montery, 253, 93943 The Naval Postgraduate School is an Equal 08 portunity/Affirmative Action Employer

Geophysicist, Tectoaophysicist/Georgia Tech.
The School of Geophysical Sciences at Georgia
Tech invites applications for a faculty appointment
in Earth Sciences. Applicates must have an outgasding research potential demonstrated by several Faculty Opening/Department of Geological Sciences, Ruigera University, Newark. Tenure-track Assistant Professorship with research and teaching interest at high the univergraduate and graduate levels in Hydringeology or Deophysics. The appointee will also be required to teach Structural Geology at the undergraduate level. Ph.D. required, publication record ant/or esperiente desirable. Puntion available July 1, 1984. Salary commensurate with unalifying and experience. redonophysirs.

The School of Geophysical Sciences has an espanding and active research program in many areas of Earth and Aumospheric Sriences. The School has 23 full-time faculty members and over 50 graduate

Applicants should submit a resume, traines of three references and a statement of research interest by March 31, 1984, its:

Dr. Andreas II. Vassiliou, Chaitman Department of Geological Sciences Rutgert University Newark, New Jersey 07102

Rangers University is an Equal Opportunity/Affir-

Ualvecalty of Arizona/Postdoctoral Research Postdon to Planetary Atmospheres. Applications are incited for postdoriural research positions at the Lunar and Planetary Laboratory, University of Arizona, in Tucson, Arizona. The two positions will involve research in planetary physics and analysis of UV data from the Voyager mission. Research opportunities for these positions include the bound and extended atmospheres and ionospheres of the giant planets and their satellites, the 10 plasma torus, earth's atmospheres, the interstellar medium, and the atmosphere and ionosphere of Venus. Applicants shoul have a strong background in theory and data analysis. Physicists and attronomers are encouraged to apply. Curriculum Vilac, lithilography and three letters of reference should be sent by March 1, 1984 to Dr. A. L. Broadfoot, Lunar and Planetary Laboratory, University of Arizona, 3625 E. Ajo Way, Tucson, Arizona 65715

The University of Arizona is an Equal Opportunity Empluyer.

Scientist I and II/Nericos I Center for Atmospheric Research. Candidate should have strong interest and publication record in tropospheric chemistry, ph.D. In chemistry or meteorology and skill with FORTRAN. Research in modeling and theory is anticipated with appointment at Srientist I and II in NCAR's Atmospheric Chemistry and Aeronomy Division. Scientist I and II appointments are for terms of up to three and four years, respectively. Individuals may be appointed to the nest higher level of scientist in accordance with UCAR Sriendlic Appointments Policy. Apply with resume to National Center for Atmospheric Research, ATTN: Margareta Domecki, P. O. Box 3000, Boulder, Colorado 80307 by December 30, 1983.

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Transactions, American Geophysical Uolon The Weekly Newspaper of Ceophysics

For speediest treatment of contributions send three copies of the riomble-spaced manuscript to one of the editors named below and one copy to

standing research potential definition and on pereint years of postdoctural experience or a well-estab-labed research record, and experience in securing research funding. Although no field of specializa-tion is extinded, preference will be given to candi-dates with a background in geophysics/

23 ful-time facinity members and over 50 graduate students.

Applications including resumes, phone numbers, and the names and addresses of at least three references should be submitted to Jean-Claude Marechal, Chairman, Geophysics Search Committee, School of Geophysical Sciences, Georgia Insdute of Technology, Atlanta, GA 30332.

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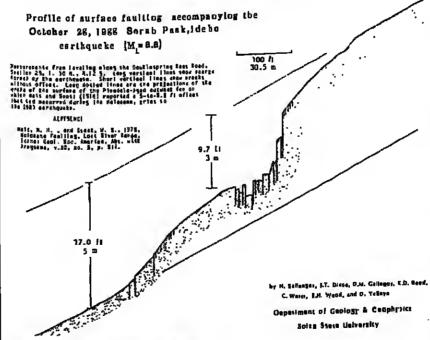
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Subscription price to members is included in annual dues (\$20 per year). Information on intututional subscriptions is actilable on request Second-class postage paid at Washington, D. G., and at additional mailing offices. East, Traumentons, American Geophysical Union (1881) 0090-11 at 39411 is published weekly by

> American Geophysical Union 2000 Flurida Avenue, N.W. Washington, DC 200119

Cover: Boreh Peak, Idako, Esrihqueke, October 28, 1983



Cover photos, reading clockwise from top left:

Looking southwest and down from a helicopter at a group of sand boils associated with the earthquake. Approximate diameter of pools is 12-18 m. Photo taken about 8 hours after the earthquake. Pools located about 0.4 km north of the north edge of the Chilly Buttes in Thousand Springa Valley. The quake produced a 40-km-long fault scarp with a normal vertical offset up to approximately 8 m running northwest-southeast along the west side of the Lost River Range, about 6 km east of the Chilly Buttes. (Photo and Information courted to the Lost River Range) sy of Jack Pelton, Boise State University.)

Looking east across the surface faulting on the Doublespring Pass Road. Total offset on fault is 3 m at this point. Main rupture zone shown here is about 60 m wide, but smaller scarps and cracks occur over a total width of about 90 m. (Photo by Nick Ballenger; Infornation courtesy of Spencer H. Wood, Boise State University.)

Looking northeast toward the normal fault scarp produced in the vicinity of Arentson Culch. This surface break was actually witnessed by two elk hunters, D. Hendricksen and J. Turner of Boise, as they drove northeastward along the rutted dirt road on the downthrown block in the foreground. Photo taken approximately 30 minutes after the earthquake from the position of the right froot dre at the time of the surface break. The vertical offset across the road is about 1,8 m. (Photo by D. Hendneksen; information courtesy of Jack Pelacotte.)

booking south and down from a helicopter at a pair of muddy-water eruptions. The hillside openings are about 5 m in width and issue from the north aide of the Chilly Buttes. Other muddy-water eruptions issued from the east side of the Chilly Buttes, Photo taken approximately 8 hours after the earthquake. (Photo and Information coursesy of Jack Pel-

CSIRO PROGRAMME LEADER \$A37.162 — \$A42.210

DIVISION OF ENVIRONMENTAL MECHANICS CANBERRA, ACT AUSTRALIA

FIELD: Porous Medium Physics.

CSIRO conducta adentille end lechnological research in laboratories located throughout Australia and employa about 7,500 etaff, of whom some 2,900 ere professional scientiste. The Organization's research activities are grouped into five institutes: Animal and Food Sciences, Biological Resources, Energy and Earth Resources, Industrial Technology and Physical Sciences. The CSIRO Division of Environmental Machanica is a member of the Institute of Physical

Research in the Division of Environmental Mechanics is directed primerily at gaining a better understanding of the biological and physical processes of the soll-plant-almosphere system with particular ragard to the transport of energy, weller, nutrients and other materials. Facilities include laboratories for soil weil, notified and other materials, micromeleorology and physica, soler radiation, fluid mechenics, micromeleorology and physiology, as well as mobile leboratories for study of the field environment. The leboratory has well as mobile leogratories for study of the liefd environment. The leogratory has a large and well instrumented boundary leyer wind tunnel, and computer fecilities for the collection end analysis of experimental deta. The Division has a micromalgorology field alte located 45 km from Cenberra. Divisional stall el present includes 15 research actentiats (biologists, physiciets and mathemeticians) togather with experimentel and technical stall, and is usually augmented by correct distinctions according to by aeveral yielting research workera.

Reasarch in the Division is divided into lour programmes — Physical Ecology. Micrometaccology, Soil Physica and Applied Machanics with each headed by e

Applications are sought for the position of Soil Physics Programme Leador, a position left vacant with the appointment of the previous leador (Dr D E Smilee) to the position of Chief of the CSIRO Division of Soils.

The Soli Physica reeserch programms is directed towards invostigating both experimental and theoretical espects of porous medium physics, with primary emphasis on physicochemical and hydrodynemic processes occuring in soils

The successful applicant will provide research leadership to the soil physics group and will underteke personal research in the erea of poroue modium physics.

Applicante abould have a PhD degree, or equivalent, logether with an established decord of personal research achievement and leadership experience. Achievemente should preferably embrace both experimentel and theoretical

Appointment on an indefinite besis is enviseged within the classification of Principel Raeearch Scientist. An epplicant with an outstending research cocord may be offered appointment at a higher level. Australian Government superan-

APPLICATIONS: Sletting full personal and protessional dotaits, the names of at laset two scientific referees, and quoting No A2234 should be directed to:

CSIRO Division of Environmental Mechanics GPO Box 821 CANBERRA ACT 2801 AUSTRALIA Sy Janus ry 20, 1864.

Faculty Positions/SUNY Stony Brook. The Department of Earth and Space Sciences, incides applications for a tenute-track faculty appointment. Rank and salary will be dependent on quabifications. The sucressful applicant must hate research experience and an interest in teaching graduate and sindergraduate students. Area of specialization are

dergraduate students. Area of specialization are open since we are looking primarily for high-caliber applicants, but preference will be given to applicants with research interests in the areas of sedimentary geology and fluid-rock interactions which complement those of the estisting program.

Qualified persons should send a resume with the names of three references to: Prof. William J. Meyers, Dept. of Earth and Space Scientes, SUNY Stony Brook, NY 11794.

SUNY Stony Brook is an equal opportunity/affirmative action employer. AK643B.

Microprobe Technology. Applications are invited for s position as microprobe technician for the Institute for the Study of Mineral Deposits. The microprobe is an ETEC (MAC-5) with 3 spectrometers with Krisel automation and a quantitative PGT energy dispersive system. The successful applicant will be responsible for the day-to-day operation of the Instrument including maintenance and repair of hardware, development of software, routine analysis of minerals, and assistance to students. A background in electronica is required. Salary commensurate with experience and qualifications.

Applicants should send a resume and three letters of recommendation to [J. Papike, Otrector, Institute for the Study of Mineral Deposits, South Dakota School of Mines and Technology, Rapid Gity, South Dakota 57701–3995. Closing dete: March 31, 1884. For additional information, call 1605) 394-8152.

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University of Washington/Faculty Position in Geo-physics. The Geophysics Program at the Univer-sity of Washington invites applications for a tenure-rrack position. The successful candidate will be ex-pected to tesch courses at the senior and graduate student level and to establish Innovative, forward-looking research programs. Applicants with a Ph.D. and evidence of outstanding potential in basic re-search in eny subfield of solid-earth geophysics will be connidered. However, applicants with prime in-terest in studying global selsmology or in studying the physical properties of the earth's manule and core will receive preference. Curriculum vitae and four letters of reference should be sent prior to 5 t January 1984 to:

Professor Ronald T. Mercil
Chairman, Recruitment Committee
Geophysics Program A K-50
University of Washington
Seattle, Washington
Seattle, WA 98195
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Louislana State University/Electronic Design Engineer. And cipated opening for electronic design engineer with experience in design and fahekallon of microprocessor-based oceanographic data recording system. Appointment for nine months to be extended if funds are available. Contact Dr. Charles Adams, Jr., Louislana State University, Coastal Studies Institute, Baton Rouge, Louislana, 70805, (504) 388-2935. Applications must be received by january 10, 1984. anuary to, 1984. LSU is an Equal Opportunity Employer,

Selsmologisa/Virginia Polytechnic Institute and State University. The Department of Feedogical Sciences at Virginia Tech society applications for an additional tenure-track faculty appointment, at the junior level, in Reflection Seismologe, Research Locilities include a complete VIBROSEIS 48-channel seismic data arministrativativation and a dedicated seignic data arquismon system and a dedicated VAX 29780 computer using DIGILON DISCO

Applicants must demonstrate a strong research record; poelerence will be given to those with experiente in the theoretical and observational aspects of reflection seimnology. Faculty members are experted to teach at both the undesgraduate and graduate levels, supervise M.S. and Ph.D. theses, and ronductive terrograms by regrand

Applicants should send a resume and the names and addresses of three referees to:

J. A. Snoke
Department of Geological Sciences
Virginia Tecli
Blacksburg, VA 24061
The appointment will begin September 1984 and candidates are capected to have completed sequitements for the Ph.D. by that time. The application deadline is March 15; 1984.
Virginia Tech is an equal opportunity/affirmative action employee.

Now Zealand Oceanographic Institute/Physical Oceanographer. A cacancy exists in Wellington, New Zealand, at the New Zealand Oceanographic Institute (Otvision of Marine and Freshwater Science) for a physical oceanographer to study dynamic processes on the continental shelf. Applicants should have a Ph.D. with 1-2 years post-doctoral for equivalent) es perience. A broad knowledge of physical oceanography is required, preferably including apecific expertise in coastal exchange processes.

Salary up 10 NZ\$30,127 per annum dependent upon qualifications and experience.

DMFS is a division of the Department of Scientific and Industrial esseath having a staff of 56 entific and Industrial esseath having a staff of 56 entific and industrial esseath having a staff of 56 entific and in marine physical geological and blokogical research housed in a new laboratory at Taupa. Present facilities include a 1000 tonnes research vessel, a comprehensive oceanographic tibuary and a multiuser minicomputer linked to a network of VAX-t1780 computer with access to an 18M 3035 mainframe system.

Further information, application forms, etc., may be obtained from: The New Zealand Enthassy, Washington, DC.

Apollegate should quote vacancy number 6169

Washington, DC: Applicants should quote vacancy number 6109 and forward applications accompanied by a resume

The Ambassador Entraordinary and Pienipotentiary
Now Zealand Embasty
Observatory Circle, NW
Washington, OC 20008
Applications must be received at the above address by February 24, 1984.

dress by February 24, 1809.

Jet Propulsion Laboratory/Physical Oceanography. An opportunity is available in the Oceanography. Croup at the Jet Propusiou Laboratocy, California Institute of Technology, for an individual with a BS or MS degree in oceanography, ocean engineering, or related field. Demonstrated ability in computer programming is required. Will participate in research projects on ocean circulation and tides in research projects on ocean circulation and tides in revolving the use of suelling alitmetric data and shipboard hydrographic datas. Please submit resume by January 18, 1984, to Professional Staffing, Department L01, jet Propusion Laboratory, California Institute of Technology, 4800 Oak Grovb Drive, Pasadeta, CA 91109.

An equal opportunity amployer.

986

PROGRAM MANAGER

TERRESTRIAL SCIENCES (GEOPHYSICS) (ANTICIPATED VACANCY)

The Air Force Office of Scientific Research, Air Force Systems Commend, located at Boiling Air Force Bess in Washington, D.C., Invites applications from qualified U.S. cilizans in the area of basic reaearch in terrestrial sciences. The eucceaeful applicent plans end menages e program relevent to underground nuclear teel detection end verification, the effects of selemic ground motion on underground structures and weepon guidance sys-tems, and determines the elze and shapa ol the earth for targeting purposes. The progrem encompasses the oretical, model and observetional selsmology, seismic in-

Sirumentation including arrays, eignel to noise enhancement, earth noise levels, geology, gravity, geodesy and computer techniques for deta enelyses. It is desired that the entre to the control of the levels and the levels are to the levels are t techniques for deta enelyses. Il la desirad that the Incumbent possess a PhD in solid earth geophysics. Demonstrated competence in technical program menagament le essential. The position is career civil service GM-13 (\$34,930-\$45,406 per year) or GM-14 (\$41,277-\$53,661 per year) depending on quelifications. No programment service is required. Send Office of Personnel Management Stendard Form 171, "Personal Quelifications Statement" and liet of publications to: Statement" and liet of publications to:

Civilien Personnel Office (#702-63) 1776 ABW/DPCA-83-1 Andrews AFB, MD 20331

Applications must be received by 15 January 1964

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Geophyales-Tectonophysics/University of Wyo-ming. Applications are invited for a tenure track position at the Assistant Professor level in the De-pattment of Geology and Geophysics. Cambidates should have teaching and research interests in such ureas as tectomophysics, thermal modeling ant/or plate tectouries. The anccessful amplicant will join an should have reaching and research interests in such areas as tectonophysics, thermal modeling and/or plate tectouics. The successful applicant will join an established Pls.D. level gerphysics propriate Duties will include reaching undergraduate and graduate sevel geophysics courses, and establishing a vigorous research program. Excellent opodumities exist for cooperation with mathematics: the Mathematic Department includes a strong numerical methods group with interests in geophysics. Send resome, transcripts and three letters of recommendation by January 15, 1984 to Peter N. Shive, Oept, of Geology/Grophysics, PO 80x 3006, University of Wyoming, Laramic, WV 82071.

The University of Wyoming Is an equal opportunity/aftermative action employer.

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Geophysiciat os Tectonophysicis/Univassity of Kansas. KU seeks spplications for a tenure-track faculty position in geophysics. Candidates should have research interests in crustal geophysics. Tho successful applicam will be axpected to teach undergraduate and graduate geophysics courses, develop an active research program, advise students, supervise graduate student theses and dissertotions, and provide service i brough administrative and professional activities. A Ph.D. in geology with specialization in geophysics is required although applicants who will complete the Ph.D. within the first year of employment at XU will be considered. The position is at the assistant professor level with a salary commensurate with qualifications. The starting date is ugust 16, 1984 and the spplication deadline is February 1, 1984. Send vita, transcripts, a brief statement of research interests and muraes the applicant feels qualified to teach, and three letters of reference to G. H. Girty, Oepartment of Geology, University of Kansas, Lawrence, Kansas 68045. The advertised position is contingent on continued state funding. For additional information contact G. H. Girty or phona (915) 864-4974.

KU is an affirmative-action, equal-opportunity employer. Applications are sought from all qualified

KU is an affirmative-action, equal-opportunity employer. Applications are sought from all qualified people regardless of race, religion, color, sex, dis-ability, veteran status, national origin, age, or ances-try.

Global Waather Dynaroies, Inc./Computer Special-list. Location: National Meteorological, and Envi-ronmental Center (NMEC) within the Meteorologi-cal and Environmental Protection Administration (MEPAI, Jeddah, Kingdom of Saudi Arabia. Academic Qualifications: Master of Science pre-fetred with major in Metenshogy and/or Computer Science. Appropriate types and duration of expen-ente may be acceptable in Iteo of academic qualifi-cations.

Experience: Extensive computer experience including responsibility for claus base design, development and insplementation together with experience in data base management preferably using Control Data Corporation (CDC) computer systems. Experience in writing requirements documents and demonstrated advanced COBOL and FORTRAN programming skills are essential. Experience in file-handling applications having professional experience with CDC uperating systems and file management. Experience in Meteorology including data quality control and lamilianity with archiving procedures in a major meteorological and/or climatological center ilegitable. Evidence of a broad interest in the environmental sciences would be an additional advantage.

tional advantage.

Duties: The appointee will report to the Atsistant Olrector of Climatology, MEPA. He will have printer or of Climatology, MEPA. He will have printer responsibility for the design, development and implementation of the digital cliatatulogical and environmental (statabase. He will be cesponsible for training a Saudi counterport in data fasse maintenance. He will also be required to liaise effectively with the Data Base Meteorologist, Quolity Control Meteorologist and Environmental Specialists in the course of carrying out the Data Base Development Program and with the computer center staff in day-to-day operations.

Global Weather Dynomics, Inc.
2400 Garden Road
Monterey, Callfornia 93940
Attention; Louise Gales.
Telephone: (408) 649-4500
Global Wenther Dynamics, Inc is an Equal Opportunity/Affirmative Action Employer.

Massachusetts Institute of Technology/Faculty Position. The Oeparment of Earth, Almospheric, and Planetary Sciences at M.I.T. arcks applicants for an appointment in the area of experimental atmospheric chemistry at the tenured full professor level. We seek an individual who is widely recognized as one of the world's leaders in experimental atmospheric chemistry and who has a broad intellectual interest in global environmental issues. The applicant should possess specific expectise in atmospheric for atmospheric and oceanic) trace gas and isotopic measurements.

Interested individuals should send a copy of their curriculum vitae and names of three references to:

William F. Arace, Chalculat.

William F. 8 rage, Clishman Dept. of Earth. Autoopheric and Planetary Sciences 54-918 M.I.T. Cambridge, MA 02189
M.I.T. is an Affirmative Action/Equal Opportunity Employer.

University of California/Faculty Appointments.

The Department of Geology and Geophysic at the University of California, Berkeley, C.A. 94720, pending budgetary approval, expects to make two faculty appointments effective Fall 1984, one at the junior level and one at the senior level. Applicants must be interested in pursuity a vigorous research program and in teaching both undergraduate and graduate students. The preferred areas of specialization are sedimentary petrology and sedimentalogy, strailgraphy and petrology and sedimentalogy, strailgraphy and petrology and sedimentalogy, strailgraphy and petrology and geology, and measurophic geology. Applications, inclining the names of references, should be sent to the Chairman at the above address by January 15, 1984.

The University of California is an Equal Opportunity/Affirmative Action Employee.

University of Washington/Paleontology/Paleoblok gy, Geochemistry. The Department of Grological Sciences invites applications in the areas of palrontology/paleobiology and geochemistry. We are interested in candidates who will establish exceptional and innovative research programs. Postdoctoral reseorch experience is highly desirable. One opening is available beginning September 1984. This is a tenuretrack potition at the rank of Assistant Professor or higher under exceptional circumstances. A second position may be available in September 1985. A paleontologist/paleobiologist may seek a joint appointment with the Burke Museum on campus. A successful candidate in either area will be expected to teach at both the undergraduate and graduate levels.

Applicanta should send vitae and names of four references to John 8. Adams, Chairman, Department of Geological Sciences, AJ-20, University of Washington, Seatle, Washington 98195. Closing date for applications is Fabruary 15, 1984.

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Atmospheric Scientist/Radiophysicist—M.I.T. A scientist is required to join the staff of the Haystack Observatory, (operated by M.I.T. on behalf of the Northeast Radio Observatory Corporation) to conduct a program of experimental investigation into the dynamics of the troposphere and stratosphere. The work will be carried out at the adjacent Millstone Hill facility using o 150 fit. diameter steemble radar which can secure returns from clear air turbulence. The successful candidate will be expected to have a Ph.O. degree obtained for research conducted in a related field, and a demonstrated ability to carry out an experimental program entalling data acquisition, analysis and theoretical interpretation. Several years experience using high-power radar for research or conducting other experimental investigations into atmospheric dynamics would be particularly valuable. Contact Or. J.V. Evans, Director, Haystack Observatory, Wastford, Mass., with resumes and references.

M.I.T. is an Equal Opportunity/Affirmative, Acuton Employer.

Jet Propulsion Laboratory Composing Analysis Oceanographer, An opportunity is available in the Oceanography Group at the Jet Propulsion Laboratory, California Instituté of Technology. The position requires a Bachelor's degree in Computer Science or related field. Experience in VAXVMS programming is essential including knowledge of FORTRAN, RATFOR and C. Familiarity with im-

age processing and remote sensing is desirable. The position will hivolve development and arointenance of an image processing system which will be used for analysis of satellite imagety. Please submit resome to Professional Staffing, Department 1.42, Jet Propulsion Laboratory, California, Institute of Technology, 4800 Oak Grove Brive, Pasadena, UA 91109.

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The College of William and Mary/Physics Faculty Position. William and Mary expects to have a tenure-track opening at the assistant-protessor level for August, 1984. Preference will be given to applicants in the fields of theoretical plasma plassics non-holing computer simulation), nonlinear mechanics, or statistical mechanics. The physics department outcombins of 22 faculty, 7 pushbactoral research associates, and 40 Ph.D. cardinlate graduate smolents. Plasma physic brooking is outcomby from NASA and the Department of Energy, Physics end vitagiand list of three references for Chairman, Search Committee, Physics Department, College of William and Mary, Williamsburg, Virginia 23185.

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Sevenaur O. Schlanger, Chaleman Department of Geological Sciences Northwestern University Evansion, 11, 60201 Nurthwestern University is an equal opportunity alliminative action employer.

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Announcements

Aeration Zones

A call for papers has been issued for the Journational Symposium on Recent Investi-guess in the Zone of Aeration (RIZA), to the led October 1-5, 1984, in Munich, West Gemany. The sympasium will muderscore he impotance of interdisciplinary communi-cain between the fields of agriculture, lipgothenistry, ecology, geochemistry, grobigy, harochemistry, hydrodogy, botone hydrodom mkrobiology, soil sciences, and water resources in the research of the misaturated

Among the topics planned for the meeting renew research methods, transport and the interaction, effects of hand use, and modeling. Also plantted are workshops on meaning techniques and applications of ini-meaning techniques and applications of ini-monpulers shing to present a paper should minit 2 one-page suntinary in English no her than January 31, 1981, to P. Udhali, HZA Symposium, Institut für Wasserchemie der TU München, Marchiminist. 17, D-8006 Munich 70, West Germany. The symptoinm is sponsored by the dejetriment of hydogeology and hydrochemistry of the Tech-nial University of Munich under the perronage of K. E. Quentin.

Seismic Deconvolution

The Society of Exploration Geophysicists (SEG) Research Committee is organizing a washop on seismic deconvolution in Vail. Colo, July 17-20, 1984. Among the topics to behauted are multiple attenuation, practi-aldeconvolution, mudel validation, wavelet minution and removal, and quantitative meaures of success.

The program will include invited in esentaion and contributed paster papers. Primars tophis will be on real data cases. Phose salegio present poster papers should send a aban to Sven Treliel, Amont Produc-botto, Secarch Center, P.O. Box 591. Take (\$ 54102; the detailline is More h 15

Mars Workshop

The Case for Mars 11," a workshop to appaise the future of manned missions to Mars, will be held in Houlder, Colo., July 10. II, 1984. Following in the Consteps of the 181 "Case for Mars Conference," the work dop aious to provide a continuing burner and omact point for those interested in manned Am masions and colonization of Mars. Potential topics include numanmed precinor missions to Marx; earth-10-Abuts transit opione Mars leading and departure systems; assign life support systems; Martium surface attacks, social and political aspects of Mats contration; and use of Martin resources. for preregistration details about the workthen committeen Hart, Laboratory for Atamphericand Space Physics, University of Glorado, Roulder, CO 80309 (telephone: 35492-8822) or Carol Stoker and Tran Mejer, Case for Mars, P.C. Box 1877, Houlke, CO 80306 (telephone: 303-191-8144). By 15, 1984, is the deadline for submitting the of papers for presentation at the meetag abasets and preregistration forms and de June 1. Registration will be limited to

For additional information on the Mars Instate of the Planetary Statety, spousor of beauthop and of university courses on opis related to Mars culonizat Indicate, Planetary Suciety, 110 S. Eude Ate, Paradena, CA 91101. Do not write be institute for workship information.

EGS Meeting

A call for papers has been issued for the McEuropean Ceophysical Society (EGS)

land Meeting, to be held July 30—August
of the tymposis and allower. Belglum, Some the tymposia and workshops organized by the External Geophysics Section (section 3) as and the meeting may be of interest to help members. The deadline for submission of shares for all of the sessions listed below a April 15, 1084, and a sessions listed below April 15, 1984. Address inquiries to the

The symposium "Solar Genphysical Indices length is being convened by L. Bossy, In-Resided is being convened by L. Bossy, In-tine d'Afronomie Spatiale de Belgique, 3 av-adby P. A. Simon of Meudon, France. L. Knou is the Convention of Meudon, France. L Knou is the convenor of the symposium in Results from European Geophysics on Spacelshin Write European Space Agency, Postbu The symposium entitled "Therrapsphere"

Innosphere Coupling at High Latindes and Possible Solar Wind/Magnetosphere Influ-ence" is being omvened by D. Rees, Depart-

UK, and by T. Killeen of Ann Arbor, Mich. "Fitting Planetary Missions" will be con-rened by F. M. Neudaner, Institut f. Geophysik and Meteorologie, Universit. zu Knin, Zulpicherstrasse, 49, D 5000 Koln I, FRG; G. Neukum of Wessling, FRG; and F. W. Taylor Predictability of

The workshop "Magnetospheric Effects of Seismic Activity" will be concented by F. Le-Jenvre, CRFE/CNRS, I avenue de la Recherche Scientilique, F 45045 Orléans Cedex, France, and by M. H. Gokhherg of Moscow,

ment of Physics and Astronomy, University Callege, Gower Street, Landon WC12 6BT.

of Oxlord, UK.

Meeting Report

The Symposium on Predictability of Meso-scale Phenomena (DM3), held at the 1983 IUGG General Assembly, addressed two questions: [1] What mechanisms control the predictability of mesoscale phenomena, in

Over what time interval care these even is be predicted? The papers presented were related more to the first question than to the second. Two sessions were organized. Session 1 was reserved for the meso-a type studies and session 2 for the meso-B type studies. Space does not permit discussion of all contribu-

tions.

In Session I, Zeng Qing-cun and Rong-fend Zi (People's Republic of China), using shallow water equations linearized with respect 10 a steady zonal flow, defined three types of instabilities which may develop disturbances (in the pressure-temperature interacting fields): (1) generalized barotropic in-stability, (2) Inertial (symmetric) instability

Meetings (cont. on p. 990)

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Meetings (cont. from p. 989)

end (3) "supercritically leigh speed instabil-ity". Kerry A. Emanuel (USA) described a similar symmetric instability for a moist case in terms of Lagrangian parcel dynamics.
Emanuel's analysis differs from the classical analysis of convective available potential energy by the fact that the displacement was performed along a surfoce of constant angulor momentum (rather than in the vertice). Case studies of alantwise moist convection show that unist adjustment in the baroclinic atmospliere proceeds in such a way as to drive toward zero the total potential energy (maximized by displacing the parcel along a surface of constant augular momentum).

Another paper JC. A. Nash, UK) suggested

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that the so-called Conditional Symmetric Instability (CSI) is responsible for the organization of the precipitation of frontal systems in quasi 2-dimensional bands parallel to the front. The author showed that if a numerical simulation of the development of CSI is performed in a fluid with constant shear end static stabilities, the flow evolves into two rolls aligned along the front with opposite senses of circulation. The rolls are separated by an updraft zone. Two papers (L. Oell'Osso of ttaly and P. Albert of Israel) were related to

orographie forcing. In session 2, Erik Rasmussen (Oenmark) showed that meso-interactions rather than baroclinic instability is the cause of polar-lows development in the Norwegian Sea. Juan Payle and others (USA) suggested that the diurnal

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cycle (nr modulation) of convection intensity often observed over the Great Plains is it result of a topographically induced convergence field and a shallow jet east of the Rocky Mountains. A boundary layer model applicable over complex terrain has simulated such a diurnel oscillation with an acceptable

A similar topographically induced phenomenon was described by Tsung-yao Wii and Shi-iing Wang (People's Republic of China).

Using Lorenz definition of the first and second kind of meso-a flows preflictability, and the feet that disturbances within those flows could be better simulated knowing initial Innrizontel wind conditions (Doppler radar), Tzvi Gal-Chen and Robert A. Kropfli (USA) tested Gal-Chen's model against boundary layer data. In order to make thet technique viable the authors indicated that the radars had to resolve the PBL with at least 15-20 rertical levels. Sun Shuging and Tien Sheng-chun (People's Republic of China) emphasized the role of the low-level jet in the formation of heavy rainfalls in China, namely some wind pulses meesured at a mountain meteorological station near the jet-axis. The authors supposed the development of a mesoscale wave widi a large amplitude, a few hours period and a speed of 80-100 km h-1.

Isidoro Orlanski and Bruce Ross (USA) presented a 3-dimensional simulation of the evolution of an observed moist cold frontal system emphasizing that on its mattire, quasisteady state the maximum rorticity line as a result of a negative feedback mechanism. This mechanism inhibits further vorticity

growth without requiring viscous demping. W. R. Peltier (Cenada) and T. L. Clark (USA), and W. R. Peltier end G. P. Kleussen (USA), using different versions of Clark's 3-0 mesoscele model simulated downelope windstorm evolutions and the collapse of finite

amplitude Kelvin-Helmhrdtz 2-D waves (for s Reynolds number $R_{\ell} > 250$) respectively. The 2-O wave seems to callapse when the Re num ber falls thewn from 900 to ≈250. The driwnshipe windstorms were explained by an overturning of the streamlines at some beight above ground. The air flowing over topography overturns, inducing a superadiobaticub-region that becomes turbulent. The author-stated that when a level of mean flow reversal is present, the wave over mountains may are plify resumantly but only if the height of the critical level above the ground is three-fourths of a critical rertical wavelength.

I would like to acknowledge the travel atsistance provided by National Science Foun-dation grant ATM-8219473.

This meeting report was prepared by Andre Doneaud, who is with the Institute of Almospheric Sciences, South Dakota School of Mines and Technology. Hology, Rapid City, SO 57701-3993.

Dissolved Loads and Water Quality

The IAHS Symposium on Dissolved Loads of Rivers and Surface Water Quantity/Quality Relationships touk place in Hamburg, West Germany, August 16-18, 1983, as pan of the IUGG 18th General Assembly. Coconvenors, B. W. Webb of the University of Exeter, UK, and R. A. Gras of Electricité de France, delineated 3 topics: "Spatiel and Temporal Varia-tions in Oissolved Loads and Solute Concentrations," "Solute Sources, Budgets, and Denudation," and "Applications of Surface
Water Quantity/Quality Relationships",
From the range of field investigations dis-

cussed, it was apparent that different perepectives on the symposium title were being affected by scale and academic ideals. That is, intense and detailed studies on smaller waterslieds were advocating study approaches radically different from those interested in macroscale (basinwide or global) analyses. The former became imbedded in assessing clemical processes and in formulating causal relationships for observed data. The latter tend to rely on empirical data-analysis techniques.

in at least half-time program of study leading to a degrae.

IIS] INDIVIOUAL SUPPORTING MEMBERSHIP Outs plus annual contribution A wide disparity of opinion was expressed on the furms of concentration-discharge or load-discharge relationships to be applied. A few participants questioned the usefulness of even formulating such relationships. At any rate, participants of this symposium expressed little interest in the cost effectioness of water-quanty that programs or in the need to develop trade-tills between costs and accuracy ni desired information. In the opinion of this reparter, this key issue should take precedence over the somewhat academic but interesting deliberations which pervaded the symposium discussions.

> This meeting report was contributed by Timothy D. Sicele, who is with the Engineering and Environmental Science Division of In-Situ, Inc., 7401 W. Mansfield Ave., Lakewood, CO 80235.

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Disputation testing, reading the magnetial structure plant it, was measured at night by means of a follow-borne spectromater pointing at a bright rising at artifug etar in the 44d ms region. Four filiphts were newferfore key 1978 to September 1981. For the last flight we nertical profiles of the MO, mixing ratio were recorded within a time span of two bours. The two profiles were identical within the error range and the everage profile is in good egreepeor with results of provious flights.

flights.
The SO, mixing retio tecressed from about S.1 ppb et
26 in to about 13.3 pph at 35 km. It fevourably compares
with theoretical predictions above 30 km and with obrevertous of NO. = NO + Nd. by solar occultation.
firsteephene, Nitrogen diohyda;
J. Geophya. Rec., Atmos., Poper 201051

Electromagnetics

CONTROL AND DIFFUSION MADES OF INDUTED EARTH CURRENT B. E. Sunsers | Department of Atchitecture, University of Minburgh, Edioburgh, U.S.)

The physical interpretation which Price 11950) tileshed to the solutions of the pre-Hervail equations is consisted and the veilelity of fineer circuit salefules to the problem of geomagnetic induction in custicated. If induced Earth cerrents era soluly diffusive, then geomagnetic induction date should be applicable in terms of controlled monitoring theory-flowers, if the Earth's Inductive response comprises also a convective correct mode shalfer to a licent strend, then a zero general formulation of the Reduction problem would be required. It is shown that he internal night-lime Si field can be attributed more easily to Iransient induction effects than to the 1951 linear circuit a proposed by Ashoar and Price 1952.

A COSTO PROGRAMMENTAL POR MINISTERS A COSTO PROGRAMMENTAL SCRIPPING BY STRIPS AND 90° DIRECTION NOTIFIED BY STRIPS AND 90° DIRECTION OF A REMAIN (Blactromagnetic Research Department, Atmost por Authority, P.O.S. 2250, 1802 Easie, farmell lie 770 physical chaory of diffraction is applied to the high frequency acettaring of a piles electromagnetic wave by a partectly confacility. Closed fore operations are united for the few Petroperson are united as the TR and Microsa. These expressions are conclined and Microsal for Expressions are conclined and Microsal for Expression. They extend the cited fore results of Tiberto and Konyoungian for strictly grazing to marry grazing incidence. The emparison with momentum them increased on the momentum which are the problem. The results for a strip are then need in a ray tracing analysis of the backscettering free e 50° dihodrai.

D780 Scattering
A PREDICTION METHOD FOR THE RECEIVED POWER BLOW BAIN
SCATTERING
J. Awaks (Keebtma Branch, Radio Smearch Laboratories,
Kashina, Ibaraki 114, Japeni
Assumptions of reinfall rate and rain attenuation
heing described by log-normal distributions lead to a
prediction of the received power from rain extracting.
Pradicted values egree quits well with the 1-year
amparlmental values of er rain extract experiment at
14.3 CHz. (Prediction, rain ecattering).
Rad, Sct., paper 381908

IN MULTIPLE POLARIZATION PLANSE ALONG SATELLITE SLANT PATHS

R. E. Harshell, T. Peact, S. A. Manus, O. P. Stapor and J. S. Andreue. (Setallita Compunications Group, Electrical Engineering Department, Firginia Polytechnic Inaticula and Scate Noiverley, Blacksburg, VA, 2466d.]

A novel approach to making differentic real lectivity measurements in suitiple pointiesion planus hee bess proposed. This paper describes a versatile technique using a machanical polarization suich and the systematic errors in differential reflectivity measurements which result. Initial results of situatements which results. Initial results of situatements which results. Initial results of situatements and polarization of at 11.6 OHs and differential reflectivity measurements of f. S. Giz using a closp polarization suict are presented. [Tropusphoric propagation, rader mateorology, dual polarization, differential reflectivity desauncements.]

Exploration Geophysics

Tules, of /4102/
Two district approaches to solving the one-dimensional selanic inverse problem are compared. These are ill the "direct" method of Goupiliaud 1901, applied to discretelt "everying media, and 171 the "lawative" methods of Ojevih et al [1616], or Gray and Wagin [1822], applied to discretely or continuously varying media. These two approaches are shown to be equivalent lates. media. Them two approaches are shown to be equivalent in two important respects. First, each method run he recovered from the other jue, the disrectized wrecker of the direct method; second, becames of the trate equivalence, each method uses the same amount of information in reconstructing a profile to a certain depth e or traveltime f into the medium. This information is the reflection data received for times less than 21. In particular, neither approach uses the "redendant deta" received after the 27 in an inversion for a profile which is known to vary only for depths which certainly in transitine Y-In this sense themselved are examined as possible, using the mining methods are as examinated as possible, using the mining methods are as examinated as possible, using the mining methods profiles.

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The Ricks of Grinking Weiss: [Paper 3W1490]

Analyzing Alternative Flood Damage Reduction Measures of Small Rural Weiersheds Using Multiple Return Period Floods: Paper 3W1235]

Let Goulter and D. R. Murgan Multiple Reservoir System Screening Models: (Paper JW1395)

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The Economics of Farm Water Supply in the Lower Bhaesai Project. Combalore, Supply in the L Determinants of Firm Water Supply in the Lower Bhaeani Project. Colcubatore, South Indio (Paper 3W1429)

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John O. Bredchoeft and Richard L. Cooley.
S. F. Kanehiro
T. N. Narazimhan
on in Aquifers' by L. W. Golbar and C. L. Axness

L. W. Gelbar and C. L. Axness

set on "Unsteady Sediment Transport Law and Prediction of Aggradation Parameters" by Romandh Padmers (Paper 1905).

Sont (Paper 1905).

Komprath Padmers (Paper 1905).

Komprath Padmers (Paper 1905).

P. 1 Son to "Radium, Thorium, and Radioscrive Lead isotopes in Groundwaters: Application to the in Situational of Adsorption-Desorption Rate Constants and Retardation Pactors" by S. Krishnaswami, W. C., 1916; K. Turuskam, and J. P. Dowel (Paper 1905).

Solution to "Sensitivity of Florida Lakes to Acidic Precipitation" by Daniel B. Cantield, Ir. (Paper 1901).

0/90 Tostrumentation and Techniques (Rader Mateorology) 3-8AND RADAS DIFFERENTIAL SEPLECTICITY MEASUREMENTS IN MULTIPLE POLARIZAYION PLANSE ALONG SATELLITE SLAST

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W.C. Claw (Schlumberger-Ool) Sesserch, c.O. Lox 307, RidgeEleid, CT 668/13
The problem of the rediction of a current loop antenna in a muticylindrical medium is lorewisted exactly in terms of an integral. The integrand is calculated using an iterative aches methog the intergral nore teneble to approximation. This closely approximates the response of a delectric logging tool such as the deep propagation tool 10771 or an induction tool in invaded borsholes. To gain more physical ionight into the waves, an asygtotic approximation of the integral is derived. Whe large parameter for the validity of this approximation is the ratio of the invasion around the borshole. An iterative scheme is deviced to compute systematically the approximation (or an arbitrary number of cylindrical layers. The multicylindrical layer model is a good model of the invasion none, borshole, and tool housing. The Clust approximation to the asimuthal electric (leid contains three terms. The first term resembles the response of a current loop in a handgeneous medium with electrical properties of the outermost medium or the Eoremtion. The higher order terms are laproximation to the air an integral medium or the Eoremation. The higher order terms are laproximation. The higher order terms are laproximation is batter at lower frequencies, lapplying that it is also good for the induction logging tool, Occasion, vol. 49, 80. 1

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Tam solutions: Servers "Dissey, olicerys" Aso
"ITERATIVE CONTINUOS" ONS-OHEMSIONAL HEVERS METHODS
Senuel S. Gray Lange Production Co., E.O. Ser 341,
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problem.

The Ley to relating the discrete, direct inversion to the continuous, frarative faversion is the Bremmer tip5il series for the reflected wave field, By using this series, it is possible to about that the equivalent inversion methods lowert the same education for the unknown acoustic impedance variations. The difference is the epicechas used to colve this agustion is analogous to the difference between solving a system of linear agustions of linear three times. The difference between solving a system of linear agustions "directly" or "Iteratively." GEOPRYSICS, VOL. 40, NO. 1

Water Resources Research

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interestion of a pressure wave with the immembers observed by rerital HF total reflection 5s described in terms of characteristic changes in the echo plane path, group path and smplitude. The interestion also produces dintorlien of the frequency modulation and entelope of the scho pulses. Describing of the laterosion are presented for scountin waves generated by ground level emplosions. Experiment used describe paises et 2.41t and 5.000 Met reflected in the 8 and 7 regions. Since the interaction lasts only a few accode, the sounding dels here been manipled for each pulse, individually recorded at the frequency of 5s pulses par second and digitized with a group time resolution of 0.5 pc. An analysis of alf the sounding persectors has been partured to delaration the profile of the ionistice ripple produced by the acquaits wave in the ionosphere. Once these measurements of the pulse markes and a sound speed sode! are used to ratrieve gradient entages during certical propagation of the ripple, then ionospheric curvature is not eignificant, the time distribution of the instantaneous frequencies within the pulse is spreased to terms of the alectron deserty profile. the instantaneous frequencies within the pulse in supressed the terms of the electron density profile gradient at the reflection levet and that is used to improve the reconstructed profile. The simplicial results of the ripple effocie on the color group path, phase path and simplicials are compared with the superimental data and found to be in good agreement. The ripple structs in the Fregion at 500 m/m and is the Fregion at 500 m/m. It is sinuscipal and characterised by relative amplitudes of 4 and 0.8 m with varylengths of 2 and 3 because of the superior of the supe respectively. Rad. Sci., Paper 381914

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the Mar-Planck-Institut für Aeronamie Londspheric kenter fear Transo, Lorsay on 9 December 1981. The haster carrier fraquency, 4.04 Max, and amplifusio-catalisted with a sel of four frequencies: 5:5, 1725, 2915 and 41.5 Mz. The matalitie detected all these fundamental fraquencies plus harmonios of the 5:5 Mz and 29.5 Mz companents, caused by the nonfinabellal mediatation of the carrier. Characteristics of the signal recoived edong the satellite track are in approximate ngivernor with the results of three-dimensional ray-tracing applied to a model of the formaphere around Trusto. The tire dispersion of the signals is best fitted with an Londspheric density codel tases on reaf-time data with

Planetology

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Particles and Fields— Ionosphere

9510 Finetric fields
VELOCITY SPIKE AY THE POLEMARD EDGE OR THE AURORAL ZONE
d. de la Bassignidire (Padio Physics Labocatery, 881
International, 313 Revenatord Avenue, Herlo Carh, CA
980251 and S. A. Heelis
Data from coordinated observations of the Chataniha
Incoherant-scatter radar and the Autosphere Explorer-C
atalities are exemined to study the policeward adge of
the auroral zone for one pass in the morning sector.

dispersion of the signals is best fitted with an ionospheric density motol tases on reaf-time data with relatively low peek values. Assessed signal lever's have been transformed to power flux by using a plasma dipole iteory and wave-polarization information obtained from the 3-d ray solutions. Drough the use of a magnety-lamb dipole theory for the induced life-region current, the oldered levels are found to correspond to talisation created by effective dipole currents between about 1.0 and 100 A. The general applies theny also predicts two solutions for mays reaching a given satellite point near the point hints of the reception zone, and a content limit corresponding to a mastic surface. Description are also predicted by "0 generatical optics theory, but the fals depths are not. Similar-box grown tobservations correspond to source region threats of about 1 for lead, Also the ELF waves observed in the ground have different harmonic signal ratios and cook mastier fluctuations than those observed on 2815.

J. Geophys. Res., Epsice, Paper 1A1752 the autoral zone for one pass in the morning sector. A rery intense, spitelite electric field is seen at the boundary between the autoral zone and the polar cap, coincident with the convection reversel. The particle-detector data are consistent with the presence of a patr of opportiely oriented potential drops parallel to the magnetic field. These potential drops are of a few handred electron volts, and their direction is such that the detection volts, and their direction is such that the presence of the clearly detected applications are series; and on the polarized data their clear in the significant continues the sector of the electric-field spite. These observations are examined in the light of recent theoretical investigations that have about that perallel acceleration can include be expected to occur in the regions of large velocity shear. The Charantz data suggest that such spites may occur repastedly at the poleward edge of the dilluse aurora, but that they are confined in either the or space.

- (Slearic tiald, are, currents, auroral mass.)

5520 Electric Pfelds INC PLASMA WAYE ENVIRONMENT OF AN AUXORAL ARC: ELECTROSTATIC TON CICLOTRON WAYES IN THE OFFUSE

6510 Atmospheres of Cleneta NEW EMPLICAL MODELS OF THE PLACEFOR TEMPERATURE AND DESIGN IN THE VEHICL CONSPORTE WITH APPLICATION TO AURORA

E. A. Bering | Physics | Dapariment, University of Moueton, University Part, Mounton, Texas, 77044 |
Entsions that appear to have been electrostatic for Cytistron (IIC) week have been observed at low ellitude in the diffuse earner by a sounding rocket payland. The rocket was launched from Poter Fiet, Alaske, at ~2010 ALT. The Cliphs successively traversed ~10 is of the diffuse earner, a darb region, end a gulat 80 R auroral arc. In the diffuse aurora, peaks were subserved in the power spectrus of the electric field at Crequencies. Dopplar shift end polarization analyses have been performed asing EC wave spectrus parameters derived from linear 1800ry, Both enalyses indicated that these entsigned had properlies consistent with those supected (or H° and 0° EIC waves. Taken together, Ima two enelyses indicated that both emission bands mere due to waves propagaling 80th ag end down the field line and saxivard parallal to the poleward boundary of the diffuse durors. The large local cold plesse dankity and resulting large Landau dampfng require that the Sourte be lotal. Transmergy for the waves was appearedly available in the 5 ph/m² downerd parallal carrent density which was infarred from the amgonatometer data. The presence of the wave indicates that this current was being carried by less than 2% of the plesses, presuably in the Corn of field eligned beam of electrons with energies of a few ev.

J. Geochym. Res., Emeca, Peper 3At009 E. A. Bering | Physics Department, University of Houston, NEW PAPERICAL WORLD OF THE FRACTION TRYPERITER AND OBSISTY IN THE VENUE INCOSPRETE VITH APPLICATION TO TRANS-PERMINATION COORDINATE PROVIDED TO TRANS-PERMINATION COORDINATE OF THE PROVIDED TO TRANS-PERMINATION COORDINATE OF THE PROVIDED THE PROVIDED THE COORDINATE OF THE OFFICE AND THE CONTINUE OF THE OFFICE AND THE CONTINUE OF THE OFFICE AND THE CONTINUE OF THE OFFICE AND THE O

J. Geophys. Res., Epage, Paper 3A1609

5648 Ionospheric disturbances INTERACTION OF AM ACCOSTON WAYE OF ARTIFICIAL ORIGIN WITH THE LOCASPHERS AS OBSERVED BY VESTICAL OF SOUNCISO AT TOTAL REPLECTION LEVELS 8. Blace [Commisserial à l'Energie Atomique, Laboretoire de Débotice et de déophymique, 8.P. nº 12, 91880 Bruyèree-le-Châtel, France).

J. Coophys. Res., Space, Paper 3A1842 lanturin Bergerefest deine, 200 Martin ber . 5-7., Sieberglere, at 1984 antijet lengtoplitat Poten, 200 Phartip dag . T f., martiggart, til 1800

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from the neutral atmospheric wind velocity [-300m/sec] ac 150 hm to a peak velocity exteeding 2000 m/sec above 500 km, in general egreement with PVO measurements of long drift in that regions. Oldels, lendesphere, Venme) a MAS/MRC Asserfete et OSFC.

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Geotectonics

Volume 16, Number 3

Rudnik G. B., Melankhalina E. N., Kudrvavisev D. L. Lomova O. S., Ssionov V. G., Shmidi O. A. Maicrial composition of the oceanic crust in fault Emperor and Murray Iauli zonea (lic Pacilic Ocean) gan L. L. Zonessiain L. P., Simidi O. A. The lectonic structure of the Hess Risc

In the Pacific Ocean (according to data of deep setsmic profiting by method reflected waven) of reliceled waven)
Ishuiln V. V. The Red Sea rift an its role in distribution of Fe-Mn mineralization
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Zverov A. T. Inferrelation of recent, newest and old vertical feetonic movement

Zverov A. T. Inferrelation of recent, newest and old vertical fectoric movement of the East-European platform.

Bocharov O. V., Gusev G. S., Esikava L. V., Spektor V. B. The map of recent verfices movements of the Yakutsk ASSY lereflory.

Maksimov E. M. On melliods of the formational analysis of the platform deposits (on the example of the West Siberian plate).

Dobrzhinofskayo L. F., Ez V. V. Metamorphic rocks in metange of the ophiolitic bells of the Lesser Caucasus (wordtshehe Adzisris).

Gurbonav A. M., Mamedov A. f., Yusifav I. S., Omarov A. M., Dzhavadav Ya. D. On teclonics of the Skabidag syncitual zone of the Greater Caucasus. Ou tectonics of the Shakhdag synctinal zone of the Greier Caucasus Kornev O. S. Anomalics and structures of the Azov-Bisck Ses region Antipov M. P. Tectnnics of the sedimentary cover of the Japan Sea parts adjacent

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cataminate aretylene (C2M21, withene (C2M21, ethans (C2M21), perchiotocthylene (C2M21) and trichiotocrhylene (C2M21) and trichiotocrhylene (C2M21). Varrical distributions of these gasos were also deteroised on flights during May 1982. The results show that C2Clu, C2M2, and C2M2 may be ganowed tracers of arctic hare. That wertical profiles suggest that political aic may be transported to the arctic l-2 km above ground and perhaps also in layers higher than this level. Trace gases, arctic hare, lifetimes! Scoplays. Pes. Lett., Paper 11.0014

1410 Geochemistry (Atmospheric chamistry) DXIDES OF MIRMSEN TT TWO SIZES IN MEW ZEALAND B.U. Stedean Loopartments of Themistry and Ethospheric A Geometre Science, Televentry of Michigan, Ann tribor, Mi., 48109; N.I. McEwen (Department of Chamistry)

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IA10 Geochamistry ithemistry of the atmosphere!

'no AND FISP TOTAL UNPOSITION PLUKES AT NEW BAVEN,

CONNECTICUT AND AT ORRENDA

t.M. Turnhian (Dept. of Geology & Geophysics, Yale University, Box 6668, New Haven, CT 05511), L.K. Beeningrand B.P. Giow

Thu Cotat deposition fluxes of 218ph ond 'Re were determined at New Haves, Commettical and Bermada over approximately the same annual period in 1917-1978. The 110ph titus bas remained virtually consisted to Ree Haven from 1973 to 1979, the titus in the 1977-1978 period being t.2 dym/cm²/y. This lower flux then capetted from model calculations is due to the uscoblishment of a bicabing bigh pressure cell during the susmor which deflects coverientai air. The 'Oe fluent at New Haven and Sarmada are 22.T and IT.I dym/cm²/y, values consisted with weatern Horth Atlanck'e ocaseic staeding com measurements, bur higher than some other outlands. crop measurements, but higher than some other estimate where the difference cannot be altributed to differed to sampling it is sacribable to regional difference compatible with the oceanin date. J. Geophys. Kes., Grees, Paper 201674

Hydrology

Hydrology

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UNSATURATED FLOW 10 BEATLALLY VARIABLE FIRLDS il.

APPLICATION OF WATER FLOW MODELE TO VARIOUS FIRLDS.

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A methud of modeling mater flow during iofilification
and wedistribution has been applied to compute empitivitions and variances of satar flow variables sod of

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simplified flow medals which case by used with confidance to applications, it is also shown that affective
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and water flue se functione of depth and tion for
Inflitration and redistribution. Towerd this aim a
simplified solution of vartical flow to a homogeneous
column based on the concept of moving front, is
developed. The scatistical procedure for using this
solution to a spristity variable field in certified.
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statisciesi momenty, randomasse, Rithetd's equation,
scar Resour. Ros., Poper JNOOS

Senta travet (Division of Soil Physics, inetitude of Soils and White, ABO, The Voltsoi Center, Bec Degan, Israel) nod Gedeon Dagso An approximate model of said transport in a spelially varieble field during infiltration and radiacribution is prespected. The vater flow is descented to be vertical and both water pore-volocity and depth of watting frost change in the horizontal plant due to the vertability and both water pora-volocity and depth of wetting frost choose to the horizontal pisor due to the wettability of soil hydraulic properties. The neit tremsport in the vertical profils in computed by eating an approximate, closed fore solution, of the convection-disparation equacion, with the value of the disparantly foursering from zer to its matikum (it and as the frost propagates downard. The concentration profils very in the horizontal plane bucauns of the veristion of water flow variablars. The expectation value sad the verience of the concentration ace computed as function of depth and time for two noils, one of large verimbility, and the second, of isnar vectability. The results are congented with those bread on a numerical simulation of the water flow and sait transport, as well as with those pertending to an equivalent, determinated the approximate model yields quite securate that the approximate model yields quite securate travite when tempered with the unserfect simulations for the field of large verimbility, whereas come differences are present for the move uniform one. The assults fac the aspected value, based on the tredictonal approach of replacing the variable lied by an equivalent uniform one, includes a much larger acror. The mule conclusion is that in apite of the apparent completity, the statistical amounts of each concentration is especially variable field can be determined by using single flow models. Itvensport modeling, bodante, randomness). momente, randomness). Warer Resour. Res., Paper 340010

3199 Canoral |Applications of Surface Soil Holeture Information] ESTIMATING PROPILE WATER OTDRAGE FROM SURPACO ZONE

ESTHATING PROPILE WATER UNDER BACK PURIOUS CONDITIONS

L. M. Arya (Lockheed Engineering and Kansgemont Estviums Company, Half Code C-31, 1830 MASA Road Cas. Rouston, Texas 77158). J. C. Richter and J. P. Arria.

Studies in remote asseing of sell solutions in the moterure information is abstituted is very shallow. Therefore, in order to unknee the utility of the reactly access soil holetter measurements, procedures and modain are regiment on spreach was under the autility access soil solutions to chose of the surface and modain are regiment on spreach was under to surface profile water acrosse from the surface sens. A linear regiment on spreach was under to surface profile water acrosse decreased in the surface mane. For a given thickness of the surface mane, the correlations between the surface hose profile depth for the confidence of the surface mane of these correlations increased in a given profile depth for some of the surface and surface and surface and soil modain and the coefficient of delaysing the relations were higher for tringsted corn lielde than for burn yields. Earnits show that the profile depth for which water alorage tam be prodicted from surface and soil modained and the coefficient of delaysing the field, and the coefficient of delaysing the surface access the surface line and the coefficient of delaysing the field conditions is bread on the thickness of the surface long in a deep profile water series of the access of the surface in a deep profile water field conditions is bread on the assession considered in a deep profile water accessed by a selection of the access of the surface flux over the saze time. Surface finess are topolock from surface-long of the access of the surface flux over the saze time. Surface finess are topolock from surface-long of the access of the surface flux over the saze time. Surface fines are face flux over the saze time. Surface fines are face flux over the saze time. Surface finess are topolock for a fall-mane profile. For a field-maceured detar and there oscende

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Meteorology

INTO Educatory Layer Attractures red processes

6 MODEL OF THE ATMOSPHERIC EQUADARY LAYER OVER THE

MAGHAL ICE DONE

J.E. Overland (Pacific Morine Freivonmento) Laboratory/

BOAA, Seatife, MA 98/05) and C.R. Pease

A coe-layer, print(live equation model is presented for
the atmospheric boundary layer aver the aergical ira
come (All) which simulates the slow rate of lowersion
from that of warning of the boundary layer seamerd
of as its wise for officies winds observed on two cruses
in the Berling Sea by the MAA R/V Surveyor. The horicontal competence gradient in the boundary layer due to
the eccanic hear flux annowed of an ice edge only slightly increases (XX) she sled speed at the majorator of the sign of the continuation of the
induced pressure gradient is largely compensanted by the
pressure gradient due to the change to inversion has of
450 m is apecified over the isotorior of the ice and drag
outflang out-ice winds is, however, very merciave rochanges to surface roughness. When an inversion base of
450 m is apecified over the isotorior of the ice and drag
outflang out-ice winds is, however, very merciave rochanges to surface roughness. When an inversion base of
450 m is apecified a rough ice of the HIZ and a 10% increase
for wind speed and a 17% morease in sized stress is the
financiar to close ice adge with a maximum to speed at 40

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for wind speed and a 17% morease in sized stress is the
interior to close ice adge with a magning of speed at 40

manual results of the modes of the HIZ and a 10% increase
for wind speed and a 17% morease in sized stress is the
interior to rough ice to open wester bugines 5 km
interior to close ice adge with a magning of speed at 40

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manual results of the modes of the HIZ and a 10% increase
for wind speed and a 17% morease in a sized stress is the
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3715 Chesical Composition
EVIBTACE FOR QUASI-PIRIODIC COMPONENTS IN LOSSON
MITTAUR: TOTAL OZONE BICORUS
Peul D. Suthric (MASA/Loddard Sparo Flight Center,
Codo Usa, Groenboit, Maryland, 2077);
Ponor spectrum enelgais has been applied to the total
cone rine Sories at each of a sample of Dobson stations
with records of more threats by years in the interval 1957
to 1981. The distributions of strongly portolic or
quasi-periedic signets show district features at periods
of 3.5-4.9 goors, 27 months, 21 menths, and 11.5 conths.
Sowers stations show two or pore such lastuces in the
same time sories. Possible geophysical implications
are discussed. 1020no, Quasi-Binnial Oscillation;
J. Geophys. Res., Green, Apper 10000) J. Geophys. Res., Green, Paper 3(000) 3715 Chemical Competition and Chemical Intersctions
AGUCOUS OXIDATION OF SO, BY HYDROGEN PEROXIDE
5. H. Junan (Frad C. Harl Assaciatas, Inc., Denyer,
Calorado B0225], A. L. Lazrus, G. I. Yab, and B. G.
Melles (National Center for Atmospheric Rotearch),
Patidan (Calorado) (MID)

J. Geophya. Sec., Freen, Paper 201861

3720 Climatology
THE GOLDSIC RETORD OF CLEMATIC CHANGE
T. J. Crodley (Physics Department, University of
Missouri-St. Louis, St. Louis, Missouri, 53121)
This paper reviews the principal results from
calcolimate studies, and insivies tectground
material abunted toward alimate modelers. The
infarred temperature history during the last 4,6
billion years indicates major changes in the exponents of the Parti's climate system. A secular
change in global insulation receipt is the to a
20-30 increase in solar luminatry almos the
formation of the earth. A Cly-Hy) greenhouse of
fect may have offest the lower improving during
early shart history. Laferred fluctuations of
global temperature have oncurred over a prosp
range of tion sealers. (In time scalers of 109-109
years paleogeographic factors (e.g., continental
drift and sea level changes) have contributed
alguliteastly to temperature changes associated
with transitions between nonglacial and global
states. Preliminary modeling efforts intivate
that additional factors (e.g., Mp., changes in
abunapheric circulation; must also be considered
in order to explain the origin of nonglacial circulation.
The origin of polar los caps may result from

In order to explain the origin of nonsheislationates.

The origin of polar toe caps may result from occur siruitation changes that were caused by plath tectomic processes. Pluginations of Ion volume on a time neare of 100-10 years correlate with involation social of the results by orbital permitted the control of the orbital permitted on the control of the control

hev. Geophys. Space Phys., Paper 380092 3735 Electrical Phenomena ERIES MERONI: COMMA-POINT MEASUMEMENTS IN COMMUNICA-3735 Siegrifical Phenomens bitles were with the temporary Code Sieg. Research 18. Weber (Navel Research Laboratory, Code Sieg. Mashington, D.C. 20171], M. F. Stawart, and A. A. Pew A metaorological radiosonde, modified by the attachmoot of vertically oriented, poloted, metal rode and associated instrumentation, was released beneath a chundoroloud at Languair Lebocatory, New Maulco. An addition to information on temperature and winds, the instrument provided re carinate of the vertical component of the cloud electric field by measurement of corose current induced in the rode. Charge volumes informed from the sounding were: 11) negative charge at 6.6 km KSL (tamperature -12° ti where continued the cloud's nost intoese precipitation echoes; 131 positive charge at 11.6 km KSL 1-50° Cl where the winds'flowed northward into the cloud's reviii; 11 a 200 m thich accenting layer of negative charge at the cloud's upper surface; and lais enail, customitated regions were evident in volumes of low pracipitation interestly ligo 0 \(\frac{1}{2} \). Which were will away from the story's tonvective center. Thundoratorum. Cloud startictly, corore, alocatic fields, lightning.) starticity, corors, alcolric fields, Lightning.)

3735 Bleetrical phanomene ACOUSTIC AMO SLECTRIC SIGNALS FROM LIGHTNING

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at her done, and an unstable surface layer over the clean or used, the model shows a decrease in vind speed and a 17% increase in a stad strong in vind speed and a 17% increase in a stad strong in vind speed and a 17% increase in a stad strong in vind speed and a 17% increase in the speed in a 17% increase in the speed in vind speed and a 17% increase in the speed of the adjo. These requires upgoed at 6 in a servard of the adjo. These requires upgoed at 6 odds and ice beard Cornection and the speed of the adjo. These requires of the adjoint of the second of the seco

3755 Interaction of atmosphure with electromagnetic ARAMETERIZATION OF CARBON CICALDE 15 Mm BAND ABSORPTION

PARMETERIZATION OF CARBON CICILDE 15 µm BAND ABSORPTION AND EMISSION

5.6.5. Ow and K.M. Liau [Metacrelegy Department, University of Utah, Sail Laka Cily, Utah 84112]

A parometerization techame far carbon dioxide 15 µm band absorption and emission it devaloped based on the inne-by-line transmittence data presented by fels and Schwarzkopf [1981]. We derive two pelynomial equations to represent the broadband emissivity as functions of the leaperdiure and pressure carrected path langth. A detailed error analysis has been performed end the roal mean squere errors are shown to be on the arder of 5r and 7.51 far the fowar and upper etmosphere cases, respectively. Cealing reles calculated from the emissivity perameteritation approach show errort afthin about 5% when they are compared afth these computed from exact line-by-line integrations. [Carbon diexide, rediction parameteritation, carbon diaxide 1R abserption].

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1970 Ascessia (Voltable Increase)

PURUSA SOFTENSES OF STRATOSPHRIC ALROSOLS OVER

PURUSA ADM TO VOLCANIC ENUTION OF EL CRICHOS IN 1982

M. Hirono (Department al Physics, Kyushu University

Fukuohs, 812, Japan) and T. Shibata

Large increases of stratospheric aerosol particles
caused by the asuption of Herican volcane Bi Chichon
in early April 1981 were abserved by a Yag lider system
at two wavatempths (1.06 on and 0.51 unlower follows
for throse months sincs April 18. Most of the obner
vations show high commontrations of aerosols is the
sittude regions from 15 to 31 km, with highest concentretions show high commontrations of aerosols is the
sittude regions from 15 to 31 km, with highest concentretions between 21 and 10 km. The aerosols optical
thickness at 0.55 km is about 0.1 - 0.3; this is shoot
10 to 10 times the maximum menthly mean values that
were observed after the Mt. Bt. Helaca event is 1980.

The more sedius of earceols in the demands part of
the El Chichon cloud is estimated to be approximately
B.t um. This estimate is based no the slow settling
volority of the prew of the cloud and from information
obtoload by compation of the two-wavalongth ildar
toturns.

A significance impact of the presence of the cloud on

taturns.

A significanc impact of the presence of the cloud on the clinate chrough variotions of stamepheric circulation is euggested. Hider, stratosphere, volcanic

Geophys. Cas. Lett., Paper 31.0058

1770 Patticles and Acronols

NRUSUAL BEHAVIOR is TSE COINSESATION SUCLE: COMENTRATES AT 30 Ke., J.M. Sowen (Dapt. of Physica
and Astronomy, University of Myoning, Larania MY
82071) and B. J. Mofease.

The results obtated with an improved belicon
borne condensation sucial (co) counter that is
capable of operating to altitedes of at less 10
km are presented. Of enjer interest to the
appearance of a questional variation mear 30
km which could be described by a sudden concentracion intreese of unusually seati particles
occurring to the winter or spring foliowed by a
one to three month docey period to background
levels. The magnitude of the verietten has increamed drematically following the recent genscally higher levels of voicanic servivty aflecting the lower steatosphere. Several porcetial explanations for the event are counidered,
but some appear entirely satisfactory or conplets at the present time. The explanation with
the tawart drawbacks would stribute the production and growth of the new on to a highly
superasturated \$250, vapor leyer generated by
any one of several proposed processes in the
uppor high latitude stratoghers.

J. Geophys. Kos., Green, Paper 300114 J. Geophys. Ros., Grasn. Paper 300114

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Egorov I. V., Osipova I. L. The structura of a low-requential tenturic field of the Far Essi by the results of numerical modelling.

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poles Barosh Yu. 8., Kropachev E. P. Collective proporties of rolor modals of kinsmatic dynamo
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mosphere Rezultov A. E., Shklyar D. R. Dafinillon of characteristics of monochromalic waves by amplitudinal measurements at ASE.

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Vol. 64, No. 51, Pages 985-992

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